

SPECIFICATION

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PLASTIC TIP SYSTEM

Background of Invention

- [0001] This invention relates to ultrasonic dental scalers, and more particularly, to a system and a method for providing individually packaged, disposable plastic tips for dental scalers for cleaning dental implants.
- [0002] Dental implants are structures that are permanently engaged in the mouth of a dental patient. Dental implants usually provide an anchor against which one or more replacement teeth or bridges are engaged. Shaped like screws, posts, blades, and other structures, dental implants can be endosseous, inserted in to the jaw bone, transosseous, inserted through the jaw bone, or subperiosteal, placed above the jaw bone.
- [0003] In addition to the variety of shapes and methods of engagement, dental implants are produced using many different materials. The materials are selected for their tolerability within the human body as well as their ability to integrate into living bone. Materials including Vitallium, aluminum oxide, commercially pure (CP) titanium, and titanium alloys are familiar dental implant materials. Recently, CP titanium and titanium alloys have been favored for their successful bone integration and their strength.
- [0004] As with the teeth and gums, dental implants require maintenance, including brushing, flossing, and routine dental checkups. Calcium and other deposits attach to titanium implants. Traditional dental scalers employing metal-based tips, whether hand-held or ultrasonic, tend to scratch titanium implants. Thus, for cleaning of titanium implants, non-metallic tips would be preferred.
- [0005] These tools, especially the insert portions thereof that come in contact with the patient, need to be sterilized, usually by autoclaving between procedures. For

example, ultrasonic dental tools usually come with a handgrip connected by a cable to water and electrical controls, and a replaceable insert having a magnetostrictive element, a velocity transducer, and a tip. The insert is typically removed from the handpiece for autoclaving between procedures. Depending on the model, the tip and/or magnetostrictive element may be removable from the velocity transducer.

[0006] The autoclave sterilization of plastic-coated tips is problematic. Autoclaving is a sterilization technique in which objects are water-steamed at 250 ° F under pressure for fifteen minutes. Autoclaving works very well for implements that are metallic. However, heat-sensitive materials, such as many plastics, tend to be denatured or destroyed after one or more sterilizations using autoclaving. Although other techniques for sterilization are known, dental offices most commonly employ autoclaving as the sole sterilization technique.

[0007] Plastic-containing tips used with ultrasonic dental scalers tend to deform or otherwise deteriorate after only a few sterilizations. Since ultrasonic scalers are carefully designed to provide a maximum vibration at the tip, any deformity of the tip can adversely affect operation. Further, deformation can render the tip ineffective at appropriately engaging with the surface of the tooth or the titanium implant. Delamination of a plastic coating or covering on the base metal of the tip can be disadvantageous, particularly when it occurs while treating a patient. Plastic-coated and plastic-covered tips can also be considered costly, as they are replaced more often than all-metal tips.

[0008] Thus, there is a need to provide tips to avoid scratching titanium implants in a cost-effective manner.

Summary of Invention

[0009] The present invention overcomes the problems noted above by disclosing prepackaged, sterilized, single-use disposable plastic tips for a dental scaler insert. Also disclosed is a method for supplying a disposable tip for use with an ultrasonic dental scaler comprising acquiring a polymeric tip for the ultrasonic dental scaler, individually packaging the tip in a biologically sealed, sterilizable container, and sterilizing the tip in the package.

- [0010] In one embodiment, the method further discloses coupling the individually packaged sterilized polymeric tip with other individually packaged sterilized polymeric tips and packaging the coupled tips as a quantity package.
- [0011] A method of using a disposable tip with an ultrasonic dental scaler is also disclosed, in which a sterilized polymeric tip is removed from a sealed container, the sterilized polymeric tip is attached to a dental insert, the sterilized polymeric tip is operated in a patient, wherein the patient has titanium implants, and the sterilized polymeric tip is disposed of.
- [0012] In one embodiment, the method further discloses purchasing a quantity package comprising a plurality of sealed containers and retrieving a sealed container comprising the sterilized polymeric tip.

Brief Description of Drawings

- [0013] Fig. 1 is a diagram of a disposable tip according to one embodiment of the invention;
- [0014] Fig. 2 is a flow diagram depicting a method for supplying the disposable tip of Figure 1 according to one embodiment of the invention; and
- [0015] Fig. 3 is a block diagram depicting a method for using the disposable tip of Figure 1 according to one embodiment of the invention.

Detailed Description

- [0016] With reference to Figs. 1–3, wherein like numerals are used to reference like parts, the present method employs a pre-packaged, sterilized, single-use dental scaler tip, to be supplied to dental professionals, for use with an ultrasonic dental scaler. The single-use tip is employed for maintenance and preventive care for patients with titanium and other dental implants. The tip is sterilized prior to packaging, then is vacuum-packed, only to be removed after purchase, such as by the dental professional just before use on a patient. Upon completion of the patient care, the tips are preferably discarded.

[0017]

Thus, according to the embodiments described herein, a method of supplying

pre-sterilized, individually packaged, single-use plastic tips, for use with ultrasonic dental scalers, is disclosed. The tips are intended for a single use by the dental professional, that is, use in a single dental patient during a single patient visit.

[0018] In Fig. 1, a sterilized, packaged plastic tip 25 is depicted, according to one embodiment. The sterilized, packaged plastic tip 25 includes a disposable tip 50 encased in a package 20. In one embodiment, the package 20 is a vacuum-sealed plastic packaging, such as packaging used to enclose hypodermic needles, medical instruments, and the like. The plastic packaging 20 comprises a see-through covering 22, such as a polyolefin polymer or copolymer, and a backing 24, either or both of which are preferably gas permeable.

[0019] In one embodiment, the backing comprises a rigid material, such as cardboard, which is treated such that the vacuum-sealed plastic packaging is suitably sterile. In a second embodiment, the backing 24 is not a rigid material, but instead is composed of a material substantially similar to the see-through covering 22. The backing 24 may itself be see-through or may be composed of a more opaque material. In either case, the covering 22 and/or the backing 24 facilitate sterilization after assembly, e.g. either or both should be gas permeable if gas sterilization will be used, or transparent to gamma radiation if this is the sterilization technique of choice.

[0020] The disposable tip 50 is designed for ease of use. In a preferred embodiment, the methods described herein are useful in connection with the production of polymeric rather than metallic tips. The polymeric tips may be composite tips, comprising multiple compounds such as those including Teflon, nylon, or other polymer-based materials. Ideally, the tips are produced inexpensively and in such a quantity so as to sell cheaply as single-use items, e.g. by injection molding or automated machining from polyethylene, polypropylene, nylon, acrylonitrile-butadiene-styrene (ABS) or a like medically suitable polymer. In a preferred embodiment, the material of the tip 50 is made from a plastic selected for its durability during use, and also for deformation at conventional autoclave conditions. This prevents a single-use tip 50 from being re-used after the autoclave procedure, e.g. if the tip 50 is inadvertently left in place when the insert is sterilized. Alternatively, the plastic can include a thermochromic indicator that permanently changes the color of the tip 50 at a predetermined temperature to

indicate an autoclave history.

- [0021] In Fig. 2, operations for supplying the disposable tip 50 are illustrated in a flow diagram, according to one embodiment. The operations depicted are preferably conducted during manufacture of the sterilized, packaged plastic tip 25. First, the plastic tip 50 is acquired (block 40). Then, the tip is packaged (block 42). In one embodiment, the packaging precedes sterilization. Any of a variety of packaging methods can be employed, such as vacuum packaging, shrink-wrap packaging, and so on. In particular, methods for packaging sterilizable medical equipment, such as hypodermic needles, operating room tools, and the like, are preferred for packaging the sterilized plastic tip 50.
- [0022] After packaging, the tip is then sterilized, preferably not using autoclaving or other steam techniques, for the reasons specified above (block 44). Instead, for example, the plastic tip can be sterilized using conventional gas (e.g. ethylene oxide) or irradiation (gamma ray) sterilization techniques, or the like.
- [0023] The packaging operation is preferably a low-cost technique, such that the retail price of the packaged sterilized tip is nominal. Optionally, the packaged tip 50 can be grouped with other packaged tips, to be sold in quantity (block 46). Once packaged, the tip can be sold or distributed (block 46).
- [0024] In Fig. 3, operations for using the disposable tip 50 are illustrated, according to one embodiment. First, the plastic tip 50 is sold, distributed and shipped to or otherwise acquired by the dental professional (block 60). Ideally, the dental professional purchases the packaged tips in bulk. The tip is removed from the sealed packaging (block 62), preferably using sterile techniques. Generally, when connecting the components of a dental scaler together, the dental professional wears sterile gloves. Once removed from its packaging, the tip can be screwed or otherwise attached onto an insert for a handpiece of an ultrasonic scaler (block 64).
- [0025] Once the tip 50 is engaged with the insert of the dental scaler, the dental scaler can be used in a well known manner. Particularly, though, patients with titanium implants are treated without concern about instrument autoclavability. Other portions of the dental scaler, such as the insert, continue to be sterilized between use by

autoclave, as is already the practice in the dental office.

[0026] Thus, the dental scaler, with the disposable tip, is used on the patient (block 66). The disposable tip 50 is preferable to decalcify titanium implants but can also be used on the teeth of the patient. Once the dental procedure is complete, the disposable tip 50 is discarded, according to one embodiment (block 68).

[0027] The above description is only illustrative of embodiments of the invention. Various changes and modifications of these embodiments will occur to the skilled artisan in view of the preceding specification. It is intended that all such modifications and changes within the scope and spirit of the appended claims be embraced thereby.